

**WHAT IS CLAIMED IS**

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1. A position measuring apparatus,  
comprising:

10 a receiver for receiving signals from a  
plurality of satellites and measuring a position of  
a mobile station based on the received signals;

an angle determination unit for  
determining angle range depending on positional  
relation between the measured position of the mobile  
station and an obstacle;

15 an orbit information extraction unit for  
extracting orbit information indicating orbits of  
the satellites from the received signals;

20 a measurement unit for measuring quality  
of the signals from at least one of the satellites  
that is expected to exist within the angle range  
based on the extracted orbit information; and

a correction unit for correcting the  
measured position of the mobile station to another  
position having a different height, according to the  
25 measured quality of the signal from the at least one  
of the satellites.

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2. The position measuring apparatus as  
claimed in claim 1, further comprising:

a display for displaying positions of the  
mobile station and the obstacle on a screen.

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3. The position measuring apparatus as  
claimed in claim 1, wherein the correction unit  
corrects whether the mobile station is on a roof of  
5 a building or on a road at the periphery of the  
building.

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4. The position measuring apparatus as  
claimed in claim 3, wherein the correction unit  
determines that the mobile station is on the roof of  
the building, when strength of the signal from the  
15 at least one of the satellites exceeds a  
predetermined value.

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5. The position measuring apparatus as  
claimed in claim 3, wherein the correction unit  
determines that the mobile station is on the road at  
the periphery of the building, when strength of the  
25 signal from the at least one of the satellites is  
less than a predetermined value.

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6. A position measuring apparatus mounted  
in a fixed reference station, for estimating a  
position of a mobile station moving in an area in  
communication with the fixed reference station,  
35 comprising:

a memory for storing position information  
relating to an obstacle;

a receiver for receiving position  
information of the mobile station that has been  
measured by the mobile station based on signals from  
a plurality of GPS satellites, and for receiving  
5 mobile station satellite information indicating at  
least one of the satellites from which the mobile  
station has received a signal;

a collator for collating reference station  
satellite information indicating at least one of the  
10 satellites from which the reference station has  
received a signal, with the mobile station satellite  
information; and

a correction unit for correcting the  
measured position of the mobile station based on a  
15 result of the collation and coordinates of the  
obstacle.

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7. The position measuring apparatus as  
claimed in claim 6, further comprising:

a display for displaying positions of the  
mobile station and the obstacle on a screen.  
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8. The position measuring apparatus as  
30 claimed in claim 6, wherein the mobile station  
satellite information indicates one of the  
satellites from which the mobile station has  
received a signal higher than a predetermined  
quality.

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9. The position measuring apparatus as claimed in claim 6, wherein the correction unit corrects whether the mobile station is on a roof of a building as the obstacle or on a road at the periphery of the building.

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10. The position measuring apparatus as claimed in claim 9, wherein the correction unit determines that the mobile station is on the roof of the building, when the mobile station satellite information matches the reference station satellite information.

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11. The position measuring apparatus as claimed in claim 9, wherein the correction unit determines that the mobile station is on the road at the periphery of the building, when the mobile station satellite information does not match the reference station satellite information.

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12. A position measuring apparatus provided in a mobile station, for estimating a position of the mobile station moving in an area in communication with a fixed reference station, comprising:

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a memory for storing position information relating to a building;

a position measuring unit for measuring a position of the mobile station, based on signals from a plurality of GPS satellites;

5 a receiver for receiving reference station satellite information indicating at least one of the satellites from which the reference station has received a signal;

10 a collator for collating mobile station satellite information indicating the at least one of the satellites from which the mobile station has received a signal, with the reference station satellite information; and

15 a correction unit for correcting the measured position of the mobile station based on a result of the collation and coordinates of the building.

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13. The position measuring apparatus as claimed in claim 12, further comprising:

25 a display for displaying positions of the mobile station and the building on a screen.

30 14. The position measuring apparatus as claimed in claim 12, wherein the mobile station satellite information indicates one of the satellites from which the mobile station has received a signal higher than a predetermined quality.

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15. The position measuring apparatus as  
claimed in claim 12, wherein the correction unit  
corrects whether the mobile station is on a roof of  
5 the building or on a road at the periphery of the  
building.

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16. The position measuring apparatus as  
claimed in claim 15, wherein the correction unit  
determines that the mobile station is on the roof of  
the building, when the mobile station satellite  
15 information matches the reference station satellite  
information.

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17. The position measuring apparatus as  
claimed in claim 15, wherein the correction unit  
determines that the mobile station is on the road at  
the periphery of the building, when the mobile  
25 station satellite information does not match the  
reference station satellite information.

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18. A position measuring apparatus for  
measuring a position of the apparatus using signals  
received from a plurality of satellites, comprising  
obstacle reflecting means containing obstacle  
35 information, characterized in that

if the apparatus cannot receive a signal  
from one of the satellites or quality of a received

signal is lower than a predetermined value, the apparatus determines that the apparatus is not positioned in an area where there is no obstacle between the satellite and the apparatus, or  
5 determines that reliability for the measured position of the apparatus is lower than that in a case where the apparatus is positioned in said area.

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19. A position measuring apparatus for measuring a position of the apparatus using signals received from a plurality of satellites, comprising  
15 a correction unit, characterized in that

if there is an obstacle between the measured position of the apparatus and a satellite, and a signal from the satellite can be received or its quality is higher than a predetermined value,  
20 then the correction unit corrects the measured position of the apparatus to an area where there is no obstacle between the satellite and the apparatus.

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20. A position measuring apparatus for measuring a position of the apparatus using signals received from a plurality of satellites, comprising  
30 a correction unit, characterized in that

if there is no obstacle between the measured position of the apparatus and a satellite and a signal from the satellite cannot be received or its quality is lower than a predetermined value,  
35 then the correction unit corrects the measured position of the apparatus to an area where there is an obstacle between the satellite and the apparatus.

5           21. The position measuring apparatus as  
claimed in claim 20 , wherein the correction unit  
corrects the measured position of the apparatus by  
an amount less than a predetermined value.

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          22. A position calculating apparatus for  
measuring a position of the apparatus based on  
15 information obtained from a GPS receiver, comprising  
obstacle reflecting means containing obstacle  
information, characterized in that

          if the obstacle reflecting means obtains  
the fact from the GPS receiver that a signal from a  
20 satellite cannot be received or its quality is lower  
than a predetermined value, and there is no obstacle  
between the satellite and the measured position,  
then the obstacle reflecting means determines that  
the apparatus is not at the measured position or  
25 determines that reliability for the measured  
position is lower than that in a case where there is  
an obstacle between the satellite and the measured  
position.

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